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# GREENING AGRO-INDUSTRIES IN THAILAND AND VIETNAM: An Introduction

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Arguably, Thailand and Vietnam can be seen as representatives of a group of second-tier newly industrializing economies in East and Southeast Asia, following the trail set out by the first industrializing tigers such as South Korea and Taiwan. Both former economies show increases in the share of the industrial (and the service) sector in economic growth, while the relative - but not the absolute - contribution of the agricultural sector to economic development is diminishing.<sup>1</sup> While both countries differ on a number of dimensions - such as the contribution various economic sectors make to economic development, the level of industrialization and modernization, the level of integration in global market, the organization of civil society, the political system, to name but a few - they also share commonalities. One of these common elements between Thailand and Vietnam can be found in the role of agro-industries in their strategy for economic development. Both countries do not so much turn away from primary agricultural production, but rather seek to increase the added value of agricultural products before exporting them to other countries within and outside the region. Hence, both countries emphasize the need for further development of industrial processing of agricultural products, and thus, show an increase in the agro-industrial and food-processing sectors. Table 1 provides an overview of food-industrial production in Thailand and Vietnam.

Table 1: Food processing industry in Vietnam and Thailand in 2000 (UNIDO, 2003)

	No. Factories	Employees (million US\$)	Output (million US\$)	Value added output	% of industrial
Vietnam*	563	112,600	1,699	185	19
Thailand**	872	200,600	6,115	925	13

\* Factories larger than 5 employees; \*\* Factories larger than 10 employees

An increasing part of these agro-industrial and food-processed products are meant for international markets. Besides the regional market in Asia, more and more food products from Thailand and Vietnam are traded with the USA and the EU member states (cf. Table 2 and Table 3). At the same time we can witness an inflow of foreign



direct investments of multinational food companies from different parts of the world to Thailand and Vietnam, engaging in the processing of primary agricultural products.<sup>2</sup> Thus, part of the agro-industrial sector in both countries is globalized, while yet another part is still largely producing for the local/national market using domestic capital, and thus only indirectly influenced by processes of globalization.

Table 2: Exports of food products by Thailand in 2001 (in million USD)

Country	Total export	Fish products	Rice	Meat	Fruits and vegetables
All countries	9,975	3,640	1,583	1,056	1,085
EU-15	1,250	156	87	385	364
Japan	2,270	1,466	26	467	169
USA	1,907	1,073	102	-	215
China	754	99	100	42	86

Source: National Food Institute (2001); UN Statistics Division (2003)

Table 3: Main agro-industrial exports from Vietnam in 2002 (in million USD)

Country	Total export	Coffee	Rubber	Tea	Rice	Seafood	Vegetables
EU-15	3,109	162.4	39.5	4.8	1.2	97.3	13.0
Japan	2,438	15.6	10.5	3.0	0.95	555.4	14.5
USA	2,421	39.5	10.1	1.7	5.7	673.7	5.9
Australia	1,329	5.9	0.25	0.04	2.0	32.0	2.1
Thailand	227	0.05	1.5	0.01	-	27.9	0.49
China	1,495	3.9	88.7	0.6	1.7	195.4	121.5

Source: Data from Vietnam Government Department of Customs

Faced with the growing industrialization, including an increase in agro-industrial production, both countries start to be confronted with issues of food-safety and environmental side-effects emerging on the public and political agendas. The international literature quite clearly indicates that industrial processing of agricultural products initially parallels higher environmental and food-safety risks, to be often followed by calls for further regulatory, monitoring and management regimes to combat these side-effects of agro-industrial development. Theoretically, the request for such environmental protection and food-safety regimes can come from different sides, in different forms, and with different force. Consequently, the responses to such requests for improved environmental quality and food-safety may be expected to differ between

countries, between sectors, and between types of companies. In part, these requests can be articulated through the global market, where consumer demand from the EU, the USA and Japan (to name but a few important countries; see Tables 2 and 3) put stringent criteria on environmental management systems of agro-industrial companies and on the quality of food products. Partly, the national governments of Thailand and Vietnam may articulate environmental and food safety requirements, either following domestic environmental and health goals and criteria, or related to an export strategy to position its agro-industrial export sector better in the international market. And partly, these requirements can be brought to the factories by local communities and environmental NGOs, which may see their direct living environment deteriorating. The dynamics of dealing with the call for environmental and food-safety regimes are determined by the specific configuration of type of producers, type of markets and type of socio-political setting in the country/locality of production. It goes without saying that multinational food industries producing in Thailand for a global market will react differently to environmental and food safety threats than small-scale household production units in Vietnam that sell on the local market only.

In comparison with other categories of industries, agro-industries often display unique dynamics in reacting to calls for more stringent regulatory regimes. Several reasons are behind this. Due to the nature of their production processes and products, agro-industries usually produce large amounts of organic wastes and use a lot of water, making their environmental performance very visible for local communities. Moreover, in producing food products agro-industries experience, in many cases, retailers and consumers insisting on environmental improvements jointly with food safety. In using fresh material the nature of processing (logistics, time planning, hygiene) and of the relations in (food) chains are usually very different from, for instance, more durable products. These specific characteristics of agro-industries and their products result in specific social and economic dynamics in environmental reform, often only partly comparable to other industrial sectors.

This special issue brings together four case studies on the degree and dynamics of greening agro-industries in Vietnam and Thailand. For each country one case study article focuses on small and medium-sized processing firms, and one on large-scale food-industries serving also the international market. While the articles are by no means meant to be representative of that country or that particular part of the agro-industrial market, together they teach us how the different local, national and global dynamics work in the greening of agro-industries in these two countries - or the failure to green agro-industries. In the first article, Pham Hong Nhat analyses the poor environmental performance of small and medium-sized agro-industries in southern Vietnam. While this sector attracts an important number of employees and contributes



with a considerable share to the economic output, the location of agro-industries in urban residential centers provides also severe problems for the local authorities and residents. The article analyses and assesses various strategies to improve the environmental performance of this sector. Tran Thi My Dieu and colleagues apply an industrial ecology perspective in analyzing the possibilities for greening large-scale food-industries located in Vietnamese industrial zones. In taking Vietnam's oldest and dirtiest industrial zone - Bien Hoa 1 - as a case study the article combines a material flow analysis and a social network analysis in outlining a technological and social feasible strategy in significantly reducing major waste streams. With the third article, the scope switches to Thailand by giving small and medium-sized food processing industries in northern Thailand central stage. Peter Oosterveer analyses the main market, policy and social dynamics that can and do play a role in greening these firms, combining literature review with intensive case study research. It is especially the lack of cooperation between governmental institutions and private industries that prevents environmental and food safety improvements. Finally, Thanet Sriwichailamphan uses the case of canned pineapple industries in Thailand to investigate how global food chains articulate environmental and food safety provisions and bring them to the local production units in Thailand. It is the foreign markets in especially the EU and the USA, which press both Thai and foreign canned pineapple producers in Thailand to include food safety in their production processes. Environmental authorities, environmental NGOs and local communities play a less prominent and often indirect role in this.

## NOTES

1. In the late 1990s, the GDP composition of Thailand was estimated as 12% agriculture, 39% industry and 49% services. At the same time, 54% of the labor force was still working in agriculture, while 15% and 31% were working in industry and services respectively. The GDP composition of Vietnam at the end of the 1990s was estimated as 26% agriculture, 49% industry and 25% services. In that same period, 69% of the labor force still worked in agriculture, while only 10% was working in the industrial sector and 21% in services.
2. Inward Foreign Direct Investments in Thailand in 2001 and 2002 were 3,813 and 1,068 million US\$, respectively. This relates to 14.4% and 3.7% of the gross fixed capital formation, respectively. For Vietnam inward Foreign Direct Investments for 2001 and 2002 were 1,300 and 1,200 US\$, respectively. For 2001, this amounted to 13.7% of gross fixed capital formation (UNCTAD, 2003). Around 3% of Thailand's FDI and around 5% of Vietnam's FDI is in food industry (Brimble, 2002; Le Dang Doanh, 2002).

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# **ENVIRONMENTAL POLLUTION AND REFORM OF VIETNAMESE SMALL AND MEDIUM-SIZED AGRO-INDUSTRIES**

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## **ABSTRACT**

The development strategy of Vietnam is to become one of the top agricultural countries in the world by the year 2010. As a result, agro-industries will play an even more important role in the industrial sector than they are doing at the moment. In Hochiminh City, the largest industrial and economic center of the country, small and medium-sized agro-industries (SMAIs) account for almost one half of the total of 30,000 existing enterprises. These SMAIs attract an important number of employees from the city and surrounding provinces, and contribute a considerable share to the economic output of the city and the country as a whole. Because of the characteristics of their production processes, and their location within residential areas, SMAIs also have a negative impact on the local people's health and the surrounding environment by discharging untreated liquid, gaseous and solid wastes. This especially is the case in the Hochiminh City region and the southern provinces of Vietnam. This study provides an analysis of the negative environmental impacts caused by some major sub-sectors of SMAIs in the Hochiminh City region and in South Vietnam, and analyses the causes of the present poor environmental performance and management of SMAIs. The study discusses some steps in moving to an adequate environmental reform strategy for SMAIs.

## **I. INTRODUCTION**

*Doi Moi*, Vietnamese for "economic renewal", started in Vietnam in 1986, following the disappointing results of the centrally planned economy after the country's unification in 1975. *Doi Moi* replaced the planned economy with a "multi-sector" economy, guided by market-economy principles but still steered by the government. "Multi-sector" refers to the co-existence of different forms of ownership including central state, local state, cooperative and private, by which the recognition of the private sector (previously confined to small family enterprises) as an element of a



socialist market economy was explicitly acknowledged (Wolff, 1999). The reform policy pursued since then has greatly improved the conditions for industrial development and, after 1989, the government has tried to shift the planning from centralized and rigid to a planning where production is linked to market demand and consumption (Dang, 1994; Wolff, 1999). As a result of *Doi Moi*, the national economy of Vietnam has grown significantly, albeit from a low starting point. Different sources show an average annual GDP growth of 8.0%, for the period of 1992-2001 and a growth of the industrial output of 13% (e.g. World Bank figures).

Besides the official efforts to restructure the state-owned enterprise (SOE) sector internally, there were also attempts to move towards increased commercialization of the state sector, especially via direct foreign investments. Nearly all of the few modern plants that were established in Vietnam in the first half of the 1990s were joint ventures. The rapid increase of foreign direct investments, both in the form of fully foreign owned industries and as joint ventures, has opened opportunities for the Vietnamese counterparts to learn management skills and the operation and maintenance of new, advanced technologies. The law permitting the establishment of private firms (Huber, 1991) was an important step in the reform of the Vietnamese economy. Most of the private establishments today are small or medium-sized, with the family firm as the most important form of private ownership (Wolff, 1999). Since the early 1990s, output of the private sector is growing annually with 18% and employment with 10.4%, with a slow down at the end of the 1990s following the Asian financial crisis.

The reform process has also positively influenced the agriculture and service sectors. Contrary to the 'transitional recession' in most of the other transformation countries (except for China), the macroeconomic and structural reforms in Vietnam led to a strong growth of the production in agriculture, trade and services, and to high income growth and considerable macro-economic stability (Wolff, 1999). Vietnam is now perceived as a nascent Asian Tiger. Reforms in rural development policies, resulting in increased investments in agriculture, have contributed to growth in the production of rice and other food-grains. Since the period 1988-1989, Vietnam has moved from a net rice importer to the third largest rice exporter in the world in the mid 1990s, after the US and Thailand (Arkadie et al., 1995). However, as the population is growing rapidly, adding 1 million people to the workforce every year, and as agriculture appears to be reaching the limits of its productivity, the government has started to promote a strategy of "modernization and industrialization".

Based on its relative advantage in agricultural production, a key element of this "industrialization and modernization" approach of Vietnam is a national development strategy to become one of the top agricultural countries in the world by 2010. As a



result, agro-industries will become even more important in the industrial sector than they are today. The leading Communist Party in its VIII Congress in 1996, proposed the orientation “to mainly develop the small and medium-sized enterprises that are based on appropriate technologies because they require less investment, create more jobs, and payback time of the capital investment is shorter” (The Central Committee of Communist Party of Vietnam, 1996). This means that in Vietnam, small and medium-sized agro-industries (SMAIs) are expected to develop rapidly from the late 1990s onward.

The development of SMAIs will, in combination with the development of other industrial sectors, contribute to national economic growth, but it will also contribute to environmental deterioration if adequate environmental management is lacking. With their large number of units, and their mostly uncontrolled discharge of solid, liquid and gaseous emissions, the SMAI sector is already one of the major sources of environmental pollution. In addition, the expansion of agricultural land is also an important cause of deforestation. These environmental impacts can thus become much worse in the near future if Vietnam pursues the development of SMAIs even further.

Thus, Vietnam is faced with the challenge to promote its agro-economic development and to protect its environment and ecosystems at the same time. During the last decade, while promoting economic development, the government of Vietnam also introduced a series of environmental laws, decrees, and directives, and established institutions for environmental monitoring and enforcement, such as the National Environmental Agency (NEA), and city/provincial Departments of Science, Technology, and Environment (DOSTEs). In this way the government is trying to promote industries and regulate them simultaneously (UNDP, 1998). However, balancing economic development with environmental protection is neither simple, nor cost-free; priorities must be set and trade-offs must be made. Although the environment has received considerable and still increasing attention over the last several years, “modernization and industrialization” remain the top priorities.

In this article, I analyze the negative environmental impacts caused by the increase of small and medium-sized agro-industries (SMAIs) in Vietnam and discuss the possibilities for environmental reform in this sector. I start by introducing the current situation of SMAIs and their development in Vietnam, followed by an analysis of the negative environmental impacts of some of the major SMAI sub-sectors in Hochiminh City and in South Vietnam. Subsequently, I consider the causes of the still poor environmental performance and environmental management of SMAIs. Finally, conclusions are drawn on the urgent need for Vietnam to develop proper environmental reform strategies for SMAIs.



## **II. VIETNAMESE SMALL AND MEDIUM-SIZED AGRO-INDUSTRIES (SMAIs) AND THEIR ENVIRONMENTAL IMPACTS**

### ***Small And Medium-Sized Agro-industries (SMAIs) In Vietnam***

SMAIs are a relatively new sector and the development of this sector is a comparatively recent phenomenon for Vietnam. Although they have a long history, SMAIs have only recently been classified as a separate important industrial sector. Currently, the sector forms a substantial part of the national industry and economy, as about 50% of the total number of small and medium-sized manufacturing industries are agro-industries, dealing mainly with agricultural activities including the processing of different crops, vegetables, fruits, poultry, dairy etc.

There are, both in literature and in practice, different definitions of Small and Medium-sized Enterprises (SMEs). The existing definitions vary greatly in terms of criteria such as capital investment and/or revenue and number of employees. This study employs a Vietnamese definition, which was elaborated by the Government of Vietnam (in its Document 681/CP-KTN issued on June 20, 1998), which considers SMEs as the ones that have a maximum registered capital of VND 5 billion (equivalent to about EUR 375,000) and/or employ less than 200 employees.

Recent inventories (MOSTE, 2001; Phung Chi Sy and Le Dong Hai, 1999) provide detailed figures on SMEs and SMAIs in Vietnam. There are 1,929,853 enterprises registered in the whole of Vietnam and among them 542,702 enterprises belong to the manufacturing sector (about 28%). SMEs account for 98% within this manufacturing sector and among them SMAIs account for around 50% (i.e. about 266,000 enterprises). Among the 542,702 enterprises of the manufacturing sector, 531,229 (or 97.9%) are private owned (private entrepreneurship), while the rest (11,473) have different forms of ownership. The distribution among the different sub-sectors within the manufacturing sector is given in Table 1.



Table 1: Distribution in number of different sub-sectors within the manufacturing sector

Sub-sector	Private ownership		Other forms of ownership	
	Number	Percentage	Number	Percentage
Total	531,229	100.0	11,473	100.0
Food and drink processing	159,366	30.0	3,909	34.0
Non-metallic mineral products	27,604	5.2	1,502	13.1
Wooden, bamboo and rice straw products	121,695	22.9	906	7.9
Weaving	44,387	8.4	591	5.2
Tannery and leather products	82,292	15.5	584	5.1
Wood furniture	43,852	8.3	551	4.8
Metal products	31,535	5.9	0	0.0
Rest 16 sub-sectors	20,498	3.8	3,430	29.9

Source: MOSTE (2001)

The distribution in the number of employees/workers in the agro-food sub-sector differs between the two categories, private owned or other forms of ownership. In the food and drink sub-sector, private enterprises are predominantly very small, because more than 90% of them have only 1-3 employees/workers. Meanwhile, other forms of ownership are mainly found with larger firms, with 72 per cent of them having between 4 and 50 employees (MOSTE, 2001).

The distribution of capital within the 3,200 state-owned and cooperative enterprises of the food and drink sub-sector differs too. Almost 65% of them have a capital of less than 300 million VND (equivalent EUR 22,600). The shortage in capital of SMEs is reduced somewhat by the loans from the state *Incombank*. Various surveys of enterprises have shown that in the mid 1990s, some 10 per cent of small firms and two thirds of medium-sized firms obtained loans from various banks (Meier and Pilgrim, 1995 and Wolff et al., 1995, as quoted by Wolff, 1999). Although informal financial sources play an important role, particularly in the trade sphere, small and medium-sized industrial firms are still largely depending on finances from their own resources and on family loans (Wolff, 1999).

A recent industrial inventory carried out by MOSTE shows that SMAIs, as well as many other SME sectors, are highly concentrated in the Hochiminh City region and in southern Vietnam in general, compared to less prominent locations in other parts of the country. In the Hochiminh City region alone, there are over 30,000 manufacturing units of all scales (MOSTE, 2000b). These units are distributed all over the city and



region, both individually located within the residential areas and (re)grouped into clusters to manufacture certain types of products or on industrial estates. The contribution of this region to the total national agro-industrial production is considerable. For example, the tanning and leather goods sub-sector in Hochiminh City produces 63.12% of the total national output of this sector, the pulp and paper sector in Hochiminh City 23.23%, and the food processing sector in Hochiminh City 62.45%.

According to MOSTE (2000b), the overall numbers of SMAIs increased gradually from 1975 to 1995, decreased slightly through 1996-1997, and then increased again. This trend parallels the trend of SMEs in general, and has also consequences for the division of manufacturing enterprises between private, state-owned and cooperative ownership. From 1994 until now, the amount of usually large-scale state-owned enterprises (SOEs) decreased as a number of them were dissolved and others were "equalized" (privatized). By 2000, the total number of SOEs in the Hochiminh City region was below 300. During the same period, the number of cooperative enterprises also decreased (at an average annual rate of 17.6%), while the number of private enterprises increased rapidly (at an average annual rate of 18%). Foreign industrial investment has been reported to continuously increase from 1994 (at an average annual rate of 15.4%) and the annual number of these investment units in Hochiminh City reached almost 300 in 2000. Most of the foreign investments in industries are in large-scale operations rather than SMEs, and in the South Vietnam they are dominantly located within different industrial estates in the Hochiminh City region and the provinces of Dongnai, Binhduong and Baria-Vungtau.

SMAIs have reached rather high growth rates during recent years. Compared with the overall national industrial output growth of 17.1% per year in this region during the period 1994-2000, some SMAI sub-sectors had considerably higher figures. For example, tanning and leather goods and rubber processing and rubber products achieved growth figures of 22.2% and 20.4% per year, respectively.

### ***Environmental Impacts Of SMAIs***

The activities of SMAIs generate large amounts of liquid, gaseous and solid wastes, which all are discharged into the environment without any treatment. In analyzing the environmental impacts caused by some major types of SMAIs, we make use of a common Vietnamese classification of SMAIs into nine major categories:



- |                               |  |
|-------------------------------|--|
| 1. Alcohol distillation       | 6. Rubber processing and rubber products |
| 2. Rice-based food processing | 7. Seafood processing                    |
| 3. Tapioca                    | 8. Sugar, and                            |
| 4. Slaughtering               | 9. Vegetable oil                         |
| 5. Tanning and leather goods, |  |

In the following, I shall briefly describe the main categories and their adverse effect on, especially, the water environment:

### *Alcohol distillation*

Many manufacturing industries in Hochiminh City use large quantities of alcohol. Alcohol is produced in the city by a number of small and medium-sized family-owned distilleries, and by a number of large state-owned factories. MOSTE (2000b) reported that Hochiminh City knows four alcohol-distilling cooperatives namely Thanhcong, Thanhlap, Doanket, and Dongloi. Each of these cooperatives functions as a cluster consisting of about 20 family production units, thus making the total number of family-owned distilleries around 80.

Wastewater, especially from the first step of distillation, has very high COD concentrations, which sometimes reach up to 100,000 mg/l (MOSTE, 2000b). Since none of these units have any waste handling facilities, their wastewater is discharged directly into the city's common sewerage system. This causes major problems, not only for the sewerage system itself by blocking it, but also for the local inhabitants in a wide area surrounding the distillation facilities through odor nuisance.

### *Tapioca processing*

In Vietnam, tapioca is planted and processed to be used as human food and animal feed. Tapioca is the second most important Vietnamese agricultural product after rice. Total tapioca production is almost 3 million metric tons, of which about 1 million tons is produced in the North, 1.4 million tons in the South, and 0.6 million tons in the central provinces of the country (MOSTE, 2000a). In Tayninh, the northwestern neighboring province of Hochiminh City, there are 143 tapioca processing units, and 39 of them are located in the town of Tayninh. In Hochiminh City, with the exception of a small number of isolated tapioca processing units, the majority (21 units), are concentrated in Tambinh and Binhchieu wards of Thuduc District.

The production of 1 kg of tapioca starch in traditional small-scale units consumes (and therefore discharges into the environment) 6-8 liters of water, and generates 3 kg of solid waste. Research carried out by the Vietnam Institute for Tropical Technology and Environmental Protection (VITTEP) at twelve small scale tapioca processing

units in Hochiminh City (MOSTE, 2000a:21) has shown that wastewater from this production process is acidic and has very high concentrations of pollutants. The recorded pH values typically varied between 3.4 and 4.7. Organic pollution was high with Biochemical Oxygen Demand ( $BOD_5$ ) of 1,000-3,000 mg/l, Chemical Oxygen Demand (COD) of 2,000-11,000 mg/l, and Suspended Solids (SS) of 200-500 mg/l. The studied wastewater also had high concentrations of nutrients, including Total Nitrogen ( $\Sigma N$ ) of 100-450 mg/l and Total Phosphorus ( $\Sigma P$ ) of 8-25 mg/l. The research also tested the ground water quality at the tapioca production site and concluded that, although the causes were not clear, they were polluted at all ten sites, with very low pH (ranging 3.7-6.4) and high concentrations of Sulphate ( $SO_4^{2-}$ ), Phosphate ( $PO_4^{3-}$ ) and Nitrite ( $NO_2$ ). These conclusions run parallel with research carried out on small scale tapioca processing units in Traco village (Tran Thi My Dieu, 2003; Le Van Khoa and Tran Thi My Dieu, 2003).

### *Slaughtering*

Slaughterhouses are scattered all over Vietnam. However, the greatest concentration is in the Hochiminh City region and in Dalat Town, one of the most famous tourist attractions in Vietnam. Except for VISSAN (the only modern abattoir in Hochiminh City), all slaughterhouses in South Vietnam can be classified as small and medium-sized enterprises and all can be classified as poorly operated with respect to modern sanitary and environmental standards. None of these units have installed waste treatment measures. Slaughterhouses threaten the environment by discharging their untreated wastes, especially wastewater, which contains up to 70-80% of organics including cellulose, proteins, amino acids, fats etc (MOSTE, 2000a). In addition, slaughterhouse wastewater can also contain parasite eggs and pathogenic bacteria, which might easily contaminate the receiving environment and endanger human health.

### *Rubber processing*

Rubber processing is considered to be one of the most polluting industrial sectors in Vietnam (MOSTE, 2000b). The southeast region of Vietnam, including the provinces of Binhphuoc, Binhduong, Dongnai and Tayninh, locates the largest rubber producing areas in the country, with an existing surface of 21,092 hectares and a projected surface of 44,450 hectares of rubber trees. The rubber processing industry in this region consists only of state-owned large-scale plants. For some 'technical' reasons, the private small and medium-sized rubber processing units are mainly located in the Hochiminh City region, especially in the part of the catchment of Tanhoa-Logom Canal, which belongs to Tanbinh District and to Districts 6 and 11 of the city. MOSTE (2000b) reports that about 80 rubber-processing units are in operation in this part of the city.



Wastewater from rubber processing has very high concentrations of organic matter, with COD ranging from 2,000 up to 26,000 mg/l depending on specific processing steps. With a water consumption rate of 30-32 cubic meters per ton of rubber milk, calculations indicate the high organic loads that these processing units can discharge into the Tanhoa-Logom Canal. The degradation of this type of wastewater creates odors that can be smelled beyond 50 meters around the site. Such processing units cause a lot of nuisance to the surrounding inhabitants in terms of odor, and none of these units have any wastewater treatment facilities.

### *Seafood processing*

Seafood processing is a rapidly growing sector in Vietnam, as in other Asian countries. There are a number of seafood processing enterprises of different scales scattered in the residential areas of Hochiminh City, and a much smaller number is operating in the neighboring provinces. These enterprises supply squids, shrimps, crabs, clams, and other seafood, to a large extent for export. Raw material for processing is transported from the surrounding coastal provinces, namely Travinh, Cantho, Camau, Bac Lieu, Angiang, and Kiengiang.

Although the specific water consumption depends on the type of raw materials used, the seafood processing industry in general is considered to be one of the largest water consumers (MOSTE, 2000c). Wastewater from this industry has high concentrations of proteins and lipids, and thus high concentrations of organic and nutrient pollutants. Characteristics of the typically common seafood processing wastewater are given by CENTEMA (2000, as quoted by MOSTE 2000c) including COD of 431-3600 mg/l, BOD<sub>5</sub> of 306-2820 mg/l, SS of 36-600 mg/l and P-PO<sub>4</sub> of 14-45 mg/l. Such wastewater is discharged untreated and continues to deteriorate the water quality of the receiving canals in Hochiminh City.

### *Sugar*

Tay Ninh Province is one of the three largest sugar cane producing centers of the country. The area for sugar cane in this province is 13,764 ha, with total production of 620,000 tons per year. Scattered in the province, there are 233 private small and medium-sized sugar-processing units and each of them has a production capacity of 20-50 tons per day. Wastewater from these units has low pH (ranging between 3 and 4), with suspended solids concentration of 1,500 mg/l, COD of 110,000 mg/l, and BOD<sub>5</sub> of 64,000 mg/l. The latter exceeds the prescribed environmental emission standards a hundred times (MOSTE, 2000a). None of the existing sugar units in Tay Ninh Province has any wastewater treatment facilities, and free discharge of untreated wastewater causes pollution of both surface and ground water.

### III. ENVIRONMENTAL REFORM OF SMAIs: CONDITIONS AND CONSTRAINTS

#### *Introduction To State Environmental Institutions And Policy*

The Constitution of the Socialist Republic of Vietnam states: “*All of the state owned organizations, enterprises, cooperatives and the armed forces are responsible for undertaking measures to protect and improve the natural resources and the environment*”.

In Vietnam, until shortly, the Ministry of Science, Technology and Environment (MOSTE), formed in October 1992 on the basis of the former State Committee for Science and Technology, was the central policy and decision-making body with overall responsibility for the environment. Within MOSTE, the National Environmental Agency (NEA) developed legislation and regulations, control and enforcement programmes and monitoring systems for environmental protection throughout the country, and served as a coordinating body in collaboration with the environmental management departments of other sectoral ministries. In addition, the local environmental authorities, known as city/provincial Department of Science, Technology and Environment (DOSTE), had an important role in environmental management and the implementation and enforcement of regulations, depending on the willingness and priority setting of the local People’s Committees.

Following the first meeting of the 11<sup>th</sup> Congress of the National Assembly in 2002, MOSTE will cease to exist (Binh Giang, 2002). Instead, a new ministry called the “Ministry of Natural Resources and Environment” will be formed on the basis of the existing NEA from MOSTE, the General Department of Land Use, and the General Department of Hydro-meteorology. At the lower levels, provincial Departments of Natural Resources and Environment will be formed accordingly.

The most important legal and institutional foundations for the incorporation of ecological aspects in economic and development policies have been constructed since the early 1990s. In 1991 the government came forward with the first *National Plan for Environment and Sustainable Development 1991-2000*. The plan was the conclusion of a debate on the environment, started by Vietnamese scientists in the 1980s and continued also in the Communist Party. It was subsequently supported by international NGOs (IUCN, WWF, UNDP and others) (Jamison and Baark, 1995 as quoted by Wolff, 1999). In 1993, the parliament passed an *Environmental Protection Law*, which defines the institutional division of labor and provides the instruments for environmental policy. In 1995, the Ministry of Planning and Investment submitted



a *Sustainable Development Plan* for the period 1996-2010, incorporating a National Environmental Action Plan. This plan announced a change of strategy from curative and repair approaches to environmental damage (e.g. reforestation) to prevention and control of developments harmful for the environment. On the medium term, public spending would be raised from 0.3% of GNP in the mid 1990s to 1% of GNP in 2010, which is, on average, equivalent to other South-East Asian countries (World Bank, 1995). Several legal documents have introduced policy instruments and strategies to operationalize these general plans and law in combating environmental pollution by, among others, industry. The most important legal documents and environmental policy instruments are listed in Box 1.

**Box 1: Legal documents on environmental policy**

- Directive No. 36-CT/TW (June 25, 1998) of the Political Bureau on strengthening environmental protection during the period of industrialisation and modernisation of the country
- Law on the Organisation of the Government (September 30, 1992)
- Decree No. 175-CP (October 18, 1994) of the Government on guiding the implementation of the Law on Environmental Protection
- Decisions No. 2920-QD/MTg (December 21, 1996) and No. 35/2002/QD-BKHNMT (June 25, 2002) of MOSTE on the application of Vietnamese Environmental Standards
- Decree No. 26-CP (April 26, 1996) of the Government on administrative penalty applied for environmental violation activities

***Internal Constraints And Barriers For Environmental Reform Of SMAIs***

In implementing the various strategies, policies, instruments and measures to reduce the environmental impacts of small and medium-sized agro-industries, Vietnam is faced with several constraints and barriers; both related to the SMAIs (internal) and related to the policy-making and implementing system (external; see next section). In the case of SMAIs, four internal constraints and barriers can be distinguished, i.e. lack of adequate knowledge, obsolete production technology, limited access to capital and lack of land.

First, SMAIs in Vietnam have generally poor knowledge of environmental impact of their production and of environmental management. In contrast to most of the larger companies, which have some knowledge of and experience with environmental management and who often have the resources to employ an environmental manager

or even an environmental management team, SMEs (and also SMAIs) often lack information and resources in this area. Responsibilities for environmental issues usually lie with busy staff who also have a number of other tasks, obligations and responsibilities (Starkey et al., 1998).

Furthermore, a major constraint is related to the limitations in human resources. Although there is a great variety in the types of entrepreneurship (e.g. Frijns et al., 1997: 15) within the small and medium-sized sector, a majority of the entrepreneurs in Vietnamese SMAIs do not originate from the higher social strata and have limited education. Entrepreneurs of SMEs (and also SMAIs) are primarily interested in making profit and hardly, if ever, in improving their environmental performance (MOSTE, 2000b). If they pay any attention to the environment at all, this is primarily because of complaints from local residents living in the vicinity of their enterprises or because it economically pays them to do so. But to achieve a win-win situation in environmental reform requires considerable human capacities and a long term strategy, which are often not available in Vietnamese SMAIs.

The labor force of small and medium-sized agro-enterprises has a low education level (Frijns et al. 1997; Breman, 1985) because an important part of the laborers at SMEs consists of rural immigrants. The importance of their rural background is hardly surprising when we realize that the origins of the “informal sector” in most countries are for an important part to be found at a continuing process of urbanization; i.e. the massive outflow of surplus labor from the countryside (Breman, 1985: 46-47). The laborers have therefore rather low skills and most of them get their training ‘on the job’ (Frijns et al., 1997). The labor force is also very diverse. Not only women, but also old, young and maimed are found in this sector, although their working capacity cannot always or sufficiently be put to use (Breman, 1985: 48). This implies that environmental awareness of the labor force as well as of most of the entrepreneurs within the SMAIs is rather low.

The limitations in human resources are also reflected in the poor management capacities in most SMAIs. Lacking functional managers and technical specialists, the small and medium-sized enterprises are usually limited in their development and innovation by the ability and knowledge of the entrepreneurs (cf. Levitsky 1983:16).

Secondly, the production technology is usually rather obsolete. Although the types of technology used in small and medium-scale industry (as well as in SMAIs) range from traditionally artisan or ‘appropriate’ technologies to modern western technologies similar to the ones used in large-scale industries (Frijns et al., 1997), a large number of the small and micro-scale agro-industries in Vietnam still use inadequate and



inefficient technology (MOSTE, 2001). The rather backward technologies within most of the existing SMAIs are the cause of inefficient use of natural resources and high levels of pollution.

In addition, and closely related to the obsolete technologies, SMAIs have a shortage of financial resources. It is quite common that SMAIs (as well as SMEs in general) are facing shortage of their financial resources for running their business. Since most of them are historically short of financial means for investments, they are not able to satisfy eligibility criteria required by the banks, and thus cannot get access to formal credit. Consequently, most of the family-based small enterprises will invest their own savings in their businesses and mobilise all possible financial resources from family members (who may also be among the poor). Thus, the available financial resources for SMAIs are very scarce and limit further the possibilities for innovations of production processes and products.

Fourth and finally, most SMAIs face a shortage in land. Except for the few newly established enterprises that could find reasonable 'good' locations for their settlement, and the ones that have been relocated out of the city centers, the majority of SMAIs are scattered around in densely populated (urban) areas, in close proximity to their neighbors. As a result, many SMAIs cause nuisance to the nearby living inhabitants. As many SMAIs were naturally established on the land owned by the entrepreneurs, the available area for their activities seems to suffice less and less over time as they expand their production. This, in addition to the shortage in finances, makes it extremely difficult for SMAIs to install any pollution control measures, even if they are willing to do so.

### ***External Barriers And Constraints For Environmental Reform Of SMAIs***

Next to these more internal barriers and constraints on environmental reform of SMAIs, we can also identify a number of external constraints, of which four major ones will be elaborated below. These are: inadequate legal system, inappropriate enforcement system, lack of popular pressure for environmental improvement and poor information.

The first major constraint relates to the lack of an adequate legal system on the environment. In general, Vietnam's Law on Environmental Protection (promulgated in 1994) provides the legal framework for, and sets out the functions and duties of, environmental management institutions at all levels, from the central government to the local and provincial Departments of Science, Technology and Environment (DOSTEs). However, although a set of environmental standards covering most field of environmental pollution has been formulated (TCVN 1995, with the latest version

TCVN 2001), the lack of human resources, knowledge and experience of administrative implementation and enforcement within the governmental agencies cause a limited effective use of these standards in production practices (Mol and Frijns, 1998; Phung Thuy Phuong, 2002; several contributions in Mol and van Buuren, 2003). This especially relates to the small and medium-sized production units. Furthermore, the legal system is incomplete as it lacks a complementing supportive structure that is so essential for the operation of SMEs in general and SMAIs in particular. Not fully recognizing the important contribution of SMAIs to the national economy, the central government has never built up a supportive structure for the sustainable development of this sector, including economic incentives, information and dissemination strategies, technological support and access to credit. The SMAIs therefore, operate spontaneously without following a strategy that is set up and guided by the central government. The contrast with the existing large-scale (state-owned) industries in this respect is large.

Secondly, the implementation deficit is also related to major shortcomings in the Vietnamese environmental policy style, which we could call a command-and-control and bureaucratic environmental policy. The development of environmental policy in Vietnam has followed the conventional model of command-and-control, which is characterized by laws, standards and regulations pertaining to emissions and products, as their main instruments, and a top-down implementation of legislation. Many countries have preceded Vietnam in the development and implementation of a strict command-and-control hierarchic policy model, and various authors have argued for the limited successes, especially in the more advanced phases of environmental reform (e.g. Huber, 1991). According to Frijns et al. (2000) and Phung Thuy Phuong (2002), for different reasons, but mainly because of the cultural characteristics, a strict command-and-control approach does not work well in Vietnam. There are also serious shortcomings in the monitoring of both emissions and environmental quality in general in Vietnam, making enforcement rather difficult. As a result, there is an absence of adequate environmental legislation, enforcement, and control for industries in general and for SMAIs in particular. Mol and Frijns (1998: 125) underline that by claiming that, “perhaps the most important provisions in the (Vietnamese) Law on Environmental Protection for present-day environmental policy-making are those on EIA [Environmental Impact Assessment]”.

Of a different nature is the weak role of social movements in pushing industries and governmental agencies towards environmental reform. Eccleston and Potter (1996), Mol and Frijns (1998), O'Rourke (1999), Phung Thuy Phuong (2002) and others have analyzed the underdeveloped role of environmental NGOs in Vietnam's environmental policy. There are almost no domestic Vietnamese environmental NGOs,



and international environmental NGOs such as ENDA and WWF perform still limited activities. According to these authors, the most important domestic Vietnamese NGO in the late 1990s was the Center for Natural Resources Management and Environmental Studies (CENRES) within the University of Hochiminh City, which is limited in capacity and which focuses mainly on academic issues. At the same time, various studies (e.g. Huber 1991; Carter 2001) have indicated the important role of environmental NGOs in setting the policy agenda, pushing industry into compliance and disseminating environmental awareness throughout wider parts of the populations. The environmental role of civil society seems also important at the local community level, where pressure is incidentally put on local authorities and entrepreneurs to improve the environmental performance of their enterprises. In this, we fully agree with O'Rourke (1999), who analyzed patterns of "community-driven regulation" in Vietnam as being of crucial importance for Vietnamese environmental reform.

The fourth and final external barrier is related to the poor access to information and communication for SMAIs. Due to limitations in budget and education levels of SMAIs, but even more so due to the lack of an adequate, tailor-made information system for this segment of industry, SMAIs have very poor access to new information, best practices, new subsidy possibilities, new regulations and the like. Most of the Cleaner Production programs of the Vietnam Cleaner Production Centre (VNCPC) are still dedicated to the larger industries, as are the other governmental and international programs (cf. Tran Van Nhan and Leuenberger, 2003). This makes any attempt to disseminate exemplary experiences about environmental awareness and improvements among SMAIs difficult.

#### **IV. RELOCATION PROGRAMS AS PART OF THE SOLUTION?**

As analyzed above, part of the difficulties in bringing about environmental reform in small and medium-sized industries is related to their geographical location in major urban areas, the limited space available and the lack of resources for individual solutions. In trying to overcome these barriers, relocation of SMEs and SMAIs out of the large residential areas to industrial parks outside the major city has been suggested at various places (cf. Frijns, 2003, for an overview). The most polluting SMAIs are usually assessed whether they have to be relocated into industrial parks. Criteria for this assessment include, but are not necessarily limited to, the following:

- Characteristics of the location and the adjacent residents,
- Scales of production and levels of pollution;
- Availability of land and budget for and willingness of implementing waste treatment facilities.

In Hochiminh City, the first serious relocation policy for SMEs is currently being implemented. In the following, I shall briefly present the current state-of-the-art as to assess whether this relocation policy will have a significant contribution to an environmental reform.

Having recognized the serious problem of environmental deterioration caused by SMEs, the leaders of Hochiminh City decided to relocate the most polluting enterprises out of the residential areas. This relocation program was initiated several years ago and is reported to be in progress now. The program aims to move the designated enterprises into certain isolated industrial estates out of the city so that their pollution can be controlled. In order to monitor the implementation of this relocation program, research has been carried out by VITTEP on 5922 small and medium-sized enterprises under the financial support of the People's Committee of Hochiminh City (People's Committee of Hochiminh City, 2002).

Of these enterprises, 438 (or 7.4%) were considered to cause most serious environmental problems, and they were identified as being in need of taking several specific measures to improve their environmental performance. Among them, 206 enterprises have been scheduled to move outside the residential areas, while the remaining 232 enterprises will either have to improve their production process and environmental quality at their actual location (mostly by installing end-of-pipe treatment facilities), or be relocated. Interestingly, within the first group there are 32 SMAIs (or 15.5%), while in the second group there are 91 SMAIs (or 39.2%). These data suggest that SMAIs are usually not within the most polluting group compared to other manufacturing activities, since SMAIs constitute about 50% of the total number of all SMEs. This, however, should not lead us to the conclusion that the environmental problems of SMAIs are not serious. In fact, as described above, SMAIs cause many serious environmental problems, not in the last place due to their large number.

As Frijns (2003) has shown in a detailed analysis of Vietnamese small and medium-sized textile and metal enterprises that were put on the list of relocation, the choice between relocation and cleaner production is not an easy one, and depend very much on the specific circumstances and characteristics of the small enterprises and their social and economic environment. In implementing relocation policies, local authorities should take these specific local circumstances into account, to be able to successfully clean up the environment without jeopardizing the SMEs' contribution to the local economy and employment.